EMIS/LEAP Nigeria Final Report
Thomas D. LeBlanc, Ed.D.
EMIS Consultant
California State University, Chico
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"The thing always happens that you really believe in; and the belief in a thing makes it happen." Frank Lloyd Wright

I. Introduction

This is a comprehensive report of findings from an education management information system (EMIS) consultancy for the Literacy Enhancement Assistance Program (LEAP) in Nigeria – a $10.7 million USAID funded primary school improvement project. The LEAP Project is being implemented by a consortium made up of the Education Development Center (EDC) in partnership with the Research Triangle Institute (RTI) and World Education. The project began in October 2001 and is being financed by a grant that will run through the end of December 2003 – that is, for approximately two years.

The LEAP Project has two primary objectives:

1. Assist the Federal Ministry of Education in conducting an Education Sector Analysis (ESA), through targeted state and local government area activities by:

    - Strengthening information-based management at the primary school, local government, state and federal levels;
    - Developing and assessing strategies to improve literacy and numeracy for primary school pupils; and
    - Assessing and analyzing teacher development and support systems.

2. Increase community-level participation in improving literacy and numeracy through an incentive-based grants program.

The LEAP Project uses an integrated approach to improve English language literacy and mathematical numeracy skills in Nigerian classrooms through a combination of policy support, interactive radio instruction, teacher training and community involvement. The LEAP Project works with State Boards of Primary Education (SPEBs), Local Government Education Authorities (LGEAs), and primary schools to model policy support systems that encourage the strategic use of information and accountability at the state, local, and community levels of the education system. There are two dimensions to this approach: (1) to demonstrate the strategic importance of information for policy, management, accountability and advocacy to relevant stakeholders at the state, local, and community levels; and (2) to involve stakeholders at all three levels in the transformation and transmission of relevant information to meet the need of improving literacy and numeracy of primary school pupils. These activities are being piloted in three states:

Kano, Lagos, and Nasarawa. It is expected that involving parents, teachers, and community organizations in policy support activities will enable local communities to address their specific needs and lead them to take on a more active role in monitoring the delivery of primary education in their local schools.

The primary objective of this EMIS consultancy was to evaluate the data collection, transmission and flow systems in the three target states in which the LEAP Project is working as a baseline for designing future programmatic interventions. I submitted a preliminary EMIS trip report to the LEAP Project Office in Abuja on 22 August 2002 in which I addressed education data information flows and quality issues as well as identified priority areas for project intervention that link data flows to policy decision-making at the state and local levels. I also suggested possible data sets by state that could be used for comparative analysis purposes. That preliminary report provided detailed observations, findings, and recommendations based on trips to Kano, Lagos, and Nasarawa over a three-week period. I traveled to these three states with Mr. A.A. Habila, the LEAP Program Policy Support Coordinator for EMIS. In each state, we visited and interviewed educational personnel in (1) Planning, Research and Statistics, (2) School Services, and (3) Personnel Management at State Primary Education Boards (SPEBs) and Local Government Education Authorities (LGEAs). We also visited and interviewed two to three Headteachers of primary schools in both urban and rural settings in each of the nine LGEAs. That preliminary EMIS report basically concluded that the supply of educational data to support decision-making at state, local, and community levels is sound. That is, the data are valid and reliable and can be used to develop indicators of educational effectiveness. This final EMIS report reviews the preliminary findings and then takes the next step by suggesting that the LEAP Project pilot test a demand-driven education management information system that could be developed from the bottom-up to inform decision and policy making at state, local, and community levels to support LEAP Project interventions to improve literacy and numeracy skills of primary education pupils in Nigeria.

II. Summary of Preliminary Report

A. Observations

1. Analysis of current education information system data collection elements and instruments

Overall, Headteachers maintain the data in school registers relatively well, although there is variation in how well the data are maintained in these registers based primarily on the urban-rural dichotomy and even within urban and rural areas. It seems that the closer a primary school is physically located to an LGEA, the better the records are maintained.

Local Government Education Authorities (LGEAs) gather data from the primary schools and collate the data at the LGEA level for further transmission to the SPEBs. Three different units – Planning, Research and Statistics (PRS), School Services, and Personnel

Management – collect very similar data with only slight variations to match their particular operational needs.

All of the data collected from the primary schools pass through the LGEAs where they are collated and sent to the state level departments of PRS, Personnel Management, and School Services where they are compiled again and submitted in reports to the Executive Chairman who usually uses the data to review the situation in each school. This is the level where most decision-making takes place.

2. Analysis of the basic education information system's current information flow from schools to LGEAs to SPEBs

Data are collected mainly to feed the decision-making process at the SPEB level. That is, the data flow up from the schools through the LGEAs to the SPEBS and are used almost exclusively at the state level to support the state level's authority to make decisions. There is very little authority at the LGEA or school level to make decisions. However, to the extent that there is any authority to make decisions at those levels, then data are used for that purpose. For example, Education Secretaries in LGEAs may withhold a teacher's salary who has left the school without permission.

Data submitted to SPEBs are not fed back to the source. Data flow up through the system but don't flow back down. Data collected are purely quantitative in nature. But at the school level, the potential exists to keep both quantitative and qualitative data if Headteachers are trained to do so and if the demand for qualitative data can be created. That is, if there was an incentive at the local level to use qualitative data, the Headteachers could maintain those data and transform the data into indicators of educational effectiveness for use by relevant stakeholders such as members of the PTA.

3. Identification of specific issues of data quality and verification (validation) at each level

The data in the registers are generally reliable. That is, data transferred from registers to data collection instruments are the same. It was not possible to check validity since the pupils were on summer vacation. But, in my opinion, the quality of the data ranged from at worse mediocre to excellent. That is, there was only one school where the maintenance of the data in the registers was mediocre.

All the LGEAs that we visited collect data from all the primary schools. They all send out inspectors or supervisors from the School Services Unit who visit all the schools from one to three times in a term. Data are also collected by the Personnel Unit through the Nominal Roll. The PRS Unit collects school data from all the schools ranging from monthly to quarterly to annually. The collection of data by three different units has the distinct advantage of providing verification through triangulation. Although it is very redundant and, therefore, inefficient, it ensures that Headteachers cannot easily misreport data from the primary level to the local level.

The SPEB is relatively removed from the realities of the school level and tends to be more suspicious of the quality of the data they are receiving from the primary schools. For example, in Nasarawa State, the PRS Director said that he was not 100% satisfied with the quality of the data because they don't collect the data themselves. They have some reservations about the reliability and validity of the data the schools give them. At times, when they're in doubt, they go out and crosscheck the data in nearby schools and many times they discover disparities. In fact, in order to address this concern, they've written to the Management Board that they should go out themselves to check the quality of the data in all the schools.

4. Analysis of existing resource allocation procedures and formulas at both LGEA and SPEB levels and their congruency with federal guidelines and procedures.

Educational personnel at both the SPEBs and the LGEAs tend to distribute resources based on the availability of the resource being distributed. They also employ a twofold criteria: equitability and proportionality. That is, if there are enough resources to distribute to all schools, then they will distribute these resources according to the enrollment of pupils and the number of teachers. However, if there are not enough resources to distribute to all schools, then they'll distribute half equally to all schools and the other half will be distributed according to need.

5. Comments on the application of information generated by federal data collection exercises at the state level, with specific reference to the recent Federal Ministry of Education Baseline 2001 school census (conducted in February 2002)

Both Kano and Nasarawa SPEBs entered data into computers that were donated by the World Bank. These computers were located in a computer center with computer operators under the PRS Department. Lagos did not have computers under the PRS Department and did not enter data at the PRS. But I was told that there is a computer center where the data were entered. However, the Director of PRS did not seem to know much about it.

Both the Directors of the PRS in Kano and Nasarawa felt that they were not informed about why they were entering data and that they were unsure what would happen next. Both expressed a desire to have an application that would allow them to extract the data for analysis at the state level. The application that the Federal MOE gave them could only be used for data entry. They do not have access to the data and expressed a strong interest to be able to access the data.

In virtually all the schools visited, the Headteachers had copies of the baseline questionnaire. There was some variation in the quality of the data in the questionnaires, especially with regard to the age-grade matrix. Those Headteachers who maintained high quality registers filled out the age-grade matrix according to the distribution of pupils by age in the registers. Those Headteachers who did not maintain high quality registers did

not provide the age-grade distribution. That is, all primary 1 pupils were 6 years old, all primary 2 pupils were 7 years old, etc. The same applied to repeater and withdrawal data. Those Headteachers who maintained such data completed the appropriate portions of the questionnaire while those who did not maintain such data did not fill in the repeater and withdrawal portions of the questionnaire.

Overall, Headteachers were able to show us the data in the registers from where they got the figures. That is, the data on the questionnaires are very reliable.

We observed two methods of distribution of the questionnaires from the LGEAs to the primary schools. Either the Heads of PRS would call the Headteachers to their office for a workshop on how to fill out the questionnaire and have them return to their schools to fill them out, or they would have the Headteachers bring their registers to the LGEA where they filled out the questionnaires together. Heads of PRS said that there was variation among Headteachers' ability to fill out the questionnaires appropriately and sometimes they had to provide a lot of assistance to some Headteachers. But overall, most Heads of PRS and virtually all Headteachers interviewed said that they did not have any difficulty filling out the questionnaires. The only complaint was that they felt that they had not been given enough resources to cover logistics. This complaint was made at the state, local, and primary school level. That is, educational personnel had been told that they would receive financial support to cover the logistics involved in distribution and retrieval of the questionnaires which never came to fruition. They also said that the timing of the data collection effort could have been smoother. That is, they complained that the exercise was too rushed. They also said that sometimes – especially in Nasarawa – they were not given sufficient questionnaires. The LGEAs also felt that they should have been given a copy of the filled out questionnaires. They also suggested that information be collected on textbooks.

Overall however, everyone interviewed at all three levels was satisfied with the operation and felt that it could easily be replicated in the future with miner changes made to improve the distribution and retrieval, including sufficient funds to cover logistical costs. They also suggested that the same format be used so that Headteachers would not have to relearn how to fill out the questionnaires.

6. Identification of available data sets in each state that could be manipulated to present comparative indicators across LGEAs and/or schools.

In all three states, we found that the following data elements are available but are not currently manipulated to use as comparative indicators across the LGEAs and the schools:

Access and Equity Indicators

- Gross Enrollment Rates
- Male-Female Pupil Ratios

- Transition Rates: promotion, repetition, and dropout
- Attendance Rates

Teacher Indicators

- Pupil-Teacher Ratio
- Teacher-Administrator Ratio
- Proportion of NCE Teachers at School
- Teacher Absenteeism Rates
- Teacher Vacancy Rates

Pedagogical Support Indicators

- Number of School Inspection Visits by LGEAs and SPEBs
- Teacher Attendance at In-Service Teacher Training Sessions

Pedagogical Materials Indicators

- Textbooks per pupil
- Pedagogical Equipment per School

This lack of manipulation of comparative indicators at all levels of the system is due to the fact that while the procedures of data collection and compilation work relatively well, analysis of the data in the form of indicators has not been introduced. That is, there is a supply of data but there is insufficient demand. Educational personnel at the state, local, and school levels could easily be trained to take the data that are available and transform them into comparative indicators to inform relevant stakeholders at all levels of the education system. That is, at the school level, Headteachers could be trained to calculate these indicators and PTAs could be trained to use them to monitor the quality of education that their children are receiving. Education Secretaries could do the same for the Local Government Council. Executive Chairmen could do the same for the Management Boards at the state level.

B. Summary of Findings and Recommendations

The following findings and recommendations are based on the above observations.

Findings:	Recommendations:
1. Data Collection The PRS, Personnel and School Services Departments collect very similar data from primary schools through the LGEAs on pupil enrollment, teaching staff, non-teaching staff, facilities and buildings.	Option 1: Formalize a process by which data collected by different departments are compared to ensure reliability. That is,

	departments ensure that their numbers match. Option 2: Streamline data collection through one department in order to reduce redundancy and ensure that all departments are using the same data from the same source to inform decision-making.
2. Data Utilization The LGEA units give the SPEB departments reports of individual school level data and the LGEAs compile the totals for their LGEA. Although there are computer centers for data entry at the SPEB level, personnel in the three departments and the corresponding LGEA units don't have computers. All the data are in paper files. SPEB departments summarize the data in reports on the LGEA basis.	Option 1: Maintain the current manual processing systems of data collection and compilation, thus limiting options for data utilization beyond the SPEB level. Option 2: Train and supply one person in each SPEB department and each LGEA unit in the use of notebook computers and database software in order to expand utilization into the areas of data analysis and report dissemination in order to enhance decision-making at the SPEB and LGEA level while simultaneously supporting decentralization of decision-making to the LGEA and school levels. Modify the flow of data from a top-down approach by incorporating a feedback mechanism through dissemination from the highly centralized decision-making authorities to the decentralized levels.
3. Decision-Making Process The LGEA units give the SPEB departments reports of problems in schools (e.g., the need of a gate for a school). They make recommendations for actions which are reconfirmed by the	Analyze the current reporting and decision-making structure. Decentralize decision-making to the lowest level.

SPEB before action is taken.	
4. Data Verification Process There is considerable variation across LGEA units in the way that they verify the quality of data collected from the schools. Some don't verify. Others crosscheck the numbers. Still others visit the schools to ensure validity and reliability.	Standardize the data verification process. Have units crosscheck similar data across units and compare to previous submissions. In cases where there is lack of agreement, send School Services Inspectors/Supervisors to review the situation on the ground and, if necessary, rectify it by warning and also training the Headteacher to maintain the records appropriately. Follow-up with a second verification visit. If problem persists, replace the Headteacher.
5. Resource Allocation Procedures and Formulas Allocation of resources is not followed consistently across all LGEAs. Some distribute according to need while others apply a combination of equity considerations and need. E.g., 50% distributed equally regardless of need; other 50% distributed according to need.	Train all LGEAs to distribute resources according to the federal guidelines and procedures.
6. Quality of Data in Federal Baseline 2001 Survey According to a LEAP EMIS research survey of primary school Headteachers carried out in July 2002, only 6 out of 30 Headteachers (i.e., 20%) indicated that they had provided information to the Federal Baseline 2001 Survey, thus suggesting that the data provided in the survey are highly suspect. This contradicts our finding that all Headteachers interviewed had a copy of the baseline survey instrument and were able to show us from which registers they	Ignore the findings from the LEAP research survey questions specifically addressing the Federal Baseline 2001 Survey. All other responses regarding data availability corresponded to our findings.

had originally transmitted the data reported, suggesting a high level of confidence in the quality of the data reported. However, this contradiction can be explained by the fact that some Headteachers told us that they hadn't been present when the LEAP data collector came to ask the survey questions: their Assistant Headteachers were interviewed in their place and had not in fact participated in the 2001 baseline survey. Therefore, when they answered that they hadn't filled it out, they were providing correct answers, thus misleading one to conclude that Headteachers hadn't filled it out the 2001 baseline survey.	

III. Next Steps

General desired outcomes of EMIS pilot test include strengthening the capacity of state and local education offices and primary schools to routinely provide more relevant, reliable, and timely data and information:

- To support more effective policy-making, planning, and monitoring, specifically monitoring the attainment of the LEAP Project targets and standards;
- To facilitate more effective and efficient management and administration of the education system;
- To facilitate analyses of discrepancies and inequities in the education system in terms of access, resource allocations, and the outputs of the education systems, particularly as related to girls and pupils in most disadvantaged areas; and
- To enhance the quality of instructional services, and ultimately increase levels of pupil learning in English and mathematics.

Achieving these desired outcomes requires the following broad activities:

(1) An implementation plan for development of a comprehensive, integrated system-wide EMIS that would include:

(i) Specification of a comprehensive set of education system data and information requirements, including, but not necessarily limited to data on enrollments, physical facilities, personnel, examinations, financial resources, school-age population, etc.;

(ii) Recommendations for strengthening existing information services and establishing a system of timely data collection, processing, retrieval, and dissemination;

(iii) A strategy for eliminating redundant data collection throughout the system; and

(iv) The specification of the roles and responsibilities to be taken by state and local education offices, and primary schools to insure an effective and efficient EMIS.

(2) A training program to strengthen the capacity of state and local education offices and primary schools to manage and implement EMIS and to more effectively use EMIS-generated data for monitoring, policy analysis, planning, management, and administration.

(3) The development of a robust and user-friendly software application system that facilitates and encourages data analysis to support monitoring, policy making, planning and management that includes a dynamic and proactive system for disseminating data and information to users at all levels in the system.

(4) An increase in public interest and debate on education issues.

(5) The development of a geographic information system to support local planning activities and the compilation, production, and dissemination of maps of schools in all districts.

IV. Elements of an Effective EMIS

The availability of relevant, reliable, unambiguous, and timely data and the provision of these data to users are the foundations of an EMIS. However, long-term sustainability is more dependent on *organizational capacity* to convert data into useful information and to use this information to expand and improve the quality of the education services it offers. Thus, in addition to resources for improving systems for collecting and maintaining educational data (i.e., the supply side), significant resources must be directed to *strengthening the use of data and information* for policy making, planning, management, and administration (i.e., the demand side).

An EMIS is a formally structured, scheduled and managed system for the collection, processing, storage, retrieval, analysis and dissemination of data and information required

to support the main activities of educational administrators and decision-makers. These activities include administration, planning, monitoring and control of project and program implementation, research, policy analysis and decision making.

This final report proposes pilot testing a computer-based EMIS in the State Primary Education Boards (SPEBs) of Kano, Lagos, and Nasarawa and the three Local Government Education Authorities (LGEAs) within each of those three states where the LEAP Project is currently working by providing notebook computers to junior level staff in the PRS, School Services, and Personnel Management Departments (SPEBs) and Units (LGEAs) who would then be trained in the use of those notebook computers in order to provide data to senior level staff to support the development of a demand-driven data-informed decision-making culture. Below are the names of the SPEBs and corresponding LGEAs where this computerized pilot test would take place.

Table 1. Pilot Test Sites for Computer-Based EMIS.

State Primary Education Boards	Local Government Education Authorities
1. Kano	1. Ajingi 2. Kano Municipal 3. Tsanyawa
2. Lagos	1. Ibeji-Lekki 2. Kosefe 3. Lagos Island
3. Nasarawa	1. Akwanga 2. Doma 3. Keffi

Emphasis on (1) the development of a computer-based EMIS to strengthen educational organizational capacity to use data and information, (2) commitment to the establishment of a demand-driven data-informed decision-making culture, and (3) the desire to improve the quality of education and the equitable distribution of educational resources reflect the LEAP Project's first objective of strengthening information-based management at the primary school, local government, state and federal levels. The piloting of a computer-based EMIS at the state and local levels would complement the work that the World Bank is sponsoring through its current Second Primary Education Project (PEP II) and proposed Universal Basic Education (UBE) Project, which are assisting the Government of Nigeria in improving its primary education program to prepare the groundwork for universal basic education by upgrading the quality of primary education, improving resource allocation, increasing enrollments, strengthening institutions, and facilitating future planning. Both PEP II and UBE propose developing the EMIS in a top-down approach from the federal level. This pilot test of an EMIS in the LEAP Project sites at the state and local levels would provide the Government of Nigeria with the experience, knowledge, and information needed to develop and implement a state and locally based EMIS nationwide from a bottom-up approach.

V. EMIS Pilot Implementation

During the remaining time of the LEAP Project, RTI could successfully employ a six-part strategy for EMIS pilot testing:

- Establish collegial relationships with SPEB/LGEA counterparts;
- Emphasize the process of EMIS development;
- Focus on defining a core set of education data requirements that support indicators of educational effectiveness;
- Use a prototyping and an iterative approach to systems and applications development;
- Phase development and implementation;
- Provide training with an emphasis on learning through practical experience;

*A **collegial approach*** would permit the development of close and on-going professional working relationships between RTI EMIS consultants and SPEB/LGEA government counterparts in the pilot sites. There would be close collaboration with staff of the SPEBs and LGEAs in all EMIS tasks, from the initial setting of the EMIS direction to the scheduling of all EMIS activities, continuing through to the completion and implementation of an EMIS pilot test work plan.

An emphasis on ***the process*** of EMIS development and implementation would result in broad-based support among various stakeholders to see the EMIS succeed, rather than focusing only on the development of elegant technical applications. While the EMIS pilot test should develop high quality technical inputs (such as a new data collection instrument that takes into account the data needs of the different departments and units of the SPEBs and LGEAs as well as a computer software application that includes data input, cross-checking and output capabilities) there should also be emphasis on process through a series of consultations, meetings, and workshops to invite involvement of all stakeholders in the process of EMIS development and to create an awareness of the potential of EMIS to support decision making at all levels. These meetings should take place early in pilot test development and continue throughout implementation. Effective communications strategies should be built into pilot test implementation from the start and institutionalized as a part of the development of the EMIS.

The objective of defining ***a core set of education data requirements that support indicators of educational effectiveness*** would permit EMIS development to become focused very quickly on the specific information needs of as broad a set of system stakeholders as possible. This would result in prioritizing data and information needs and in setting realistic objectives for which data could be collected and transformed into

indicators of educational effectiveness sooner rather than later in the development process.

The use of a ***prototyping and an iterative approach*** to systems and applications development would result in broad-based collaborative involvement and sharing of responsibility for system design and development. Representatives ranging from members of the PTA to primary school Headteachers to local and state education officers in the pilot sites would be included in system design and development.

A phased approach to EMIS development would ensure that new applications would be introduced in a systematic and orderly manner, such as the development of the computer software application to support data entry, cross-checking and report production for the departments and units of (1) Planning, Research and Statistics, (2) School Services, and (3) Personnel. It would permit the accurate assessment of resource requirements for expanding the system from pilot sites to all SPEBs and LGEAs and to focus on the specific needs of deprived states and local governments (i.e., those with inadequate infrastructure). A phased approach would also permit RTI EMIS consultants to work more intensely with a smaller number of SPEB/LGEA counterparts, thus building local capacity to move the system forward.

Finally, ***extensive training*** would be central to strengthening capacity among educational personnel at the pilot sites. Training would be a continuous and on-going process, with an emphasis on learning through practical experience and the sharing of knowledge between RTI EMIS consultants and SPEB/LGEA counterparts. Training activities would revolve around specific EMIS issues (e.g., development of a school census application), integration of multiple data sets (e.g., PRS, School Services, and Personnel) and conducting effective policy analysis (e.g., analysis of agreed upon indicators of educational effectiveness with statistical software packages such as SPSS).

Table 2. Possible EMIS Training Courses.

1. Introduction to EMIS
2. Data Integration, Linkages and Use
3. Development of Educational Indicators to Monitor Primary School Performance
4. Introduction and Use of Educational Indicators of Effectiveness to Support Decision Making
5. Introduction to Computers
6. Introduction to Windows Operating System
7. Introduction to Word
8. Introduction to Excel
9. Introduction to Access
10. Introduction to GIS (e.g., ArcView)
11. Introduction to SPSS
12. Introduction to Software Application Development
13. Introduction to Policy Analysis of Educational Indicators Using SPSS

V. EMIS Pilot Test Activities

The central ***goal of an EMIS*** is to contribute to the formation of a demand-driven data-informed decision-making capacity that links policy to practice, practice to performance, and performance to accountability at all levels of the education system. EMIS is a critical and necessary investment to focus the government's effort on transparent management, performance and accountability, and to move from top-down "directive" administrative control to bottom-up "consultative" performance management that takes into account community needs. The central ***objective of EMIS*** is to strengthen the capacity of the state boards and local education authorities to routinely provide more relevant, reliable, and timely data to support a data-informed decision-making capacity at all levels. The central ***objective of an EMIS Pilot Test*** would be to determine the activities, levels of effort and resources required to extend the EMIS from three state and nine local pilot sites to the rest of the country.

In order to achieve this, an EMIS pilot test work plan would be devised based on three main activity areas:

1. Input Processes
2. Operational Processes
3. Output Processes

Input Processes are those activities related to defining, preparing, receiving, storing and disseminating inputs to the operations (i.e., production) processes. To establish what is needed in terms of outputs, an EMIS Team made up of RTI EMIS consultants and SPEB/LGEA counterparts would review current institutional and organizational provisions and assess their capacity to meet the future information needs of the state boards and local government authorities in an effective and efficient way. This review would determine the deficiencies of the current system and result in recommendations for changes to be made to establish an effective and efficient EMIS. (Note: This activity was started during the three-week EMIS consultancy in August. See the "EMIS/LEAP Nigeria Preliminary Trip Report," dated 22 August 2002 for more details.)

Operational Processes are those activities that transform inputs into planned products at a specified standard of performance. The activities identified in this area would be the processes that need to be established so that the EMIS may produce planned reports in a relevant, reliable, and timely manner.

Output Processes include those activities that are directed at distributing and marketing the products of the EMIS. The EMIS is functional when its products are delivered to education system managers, decision-makers, and relevant stakeholders in a relevant, reliable, and timely manner. To achieve this, the EMIS would have to be proactive; it would have to service the specific needs of education system managers, decision-makers, and relevant stakeholders at all levels. At the same time, the EMIS would need to play a role in helping to reorient state boards and local education authorities away from a top-

down directive approach to a bottom-up performance-oriented approach in which local communities would play a significantly larger role in monitoring school performance.

Table 3 includes examples of the types of activities that would be undertaken during an EMIS pilot test phase.

Table 3. EMIS Pilot Test Task/Activities Schedule.

Task/ Activity Schedule	2002		2003			
	Q3	Q4	Q1	Q2	Q3	Q4
1. INPUT PROCESSES						
Policy Review						
Organizational Review						
Institutional Review						
Annual Census Review						
Data Collection Review						
Data Reception & Storage Review						
Application Development Review						
Computer Capacity Review						
Research & Analysis Capacity Review						
Assessment Report						
Pilot Site EMIS Computer Cell Installation						
Computer Training						
2. OPERATIONAL PROCESSES						
EMIS database application Development						
Geographic Information System						
New Census Data Collection Form						
Data Collection Process						
Data Entry Process						
Data Reception & Storage System						
Report Production						
Database Linkages (FMOE, SPEBs, LGEAs)						
Establish Policy Analysis Capacity						
3. OUTPUT PROCESSES						
Standard Report Distribution						
Policy Research Reports Distribution						
Comprehensive, Integrated EMIS Plan Design						

VI. Development of a Computer-Based EMIS Database Application

The objective of the development of a robust and user friendly EMIS database application is to improve the flow of data between schools, LGEAs, SPEBs and the federal MOE and to increase access to education system data and information. As such, it would need to include a series of related databases and an interface that permits users of various skill levels to access a broad range of educational data and information. This application would include facilities for data collection, data entry, data storage, generation of a range of standardized reports relevant to the needs of each level in the system, and easy access to all data elements to permit development of indicators of educational effectiveness and the production of adhoc reports.

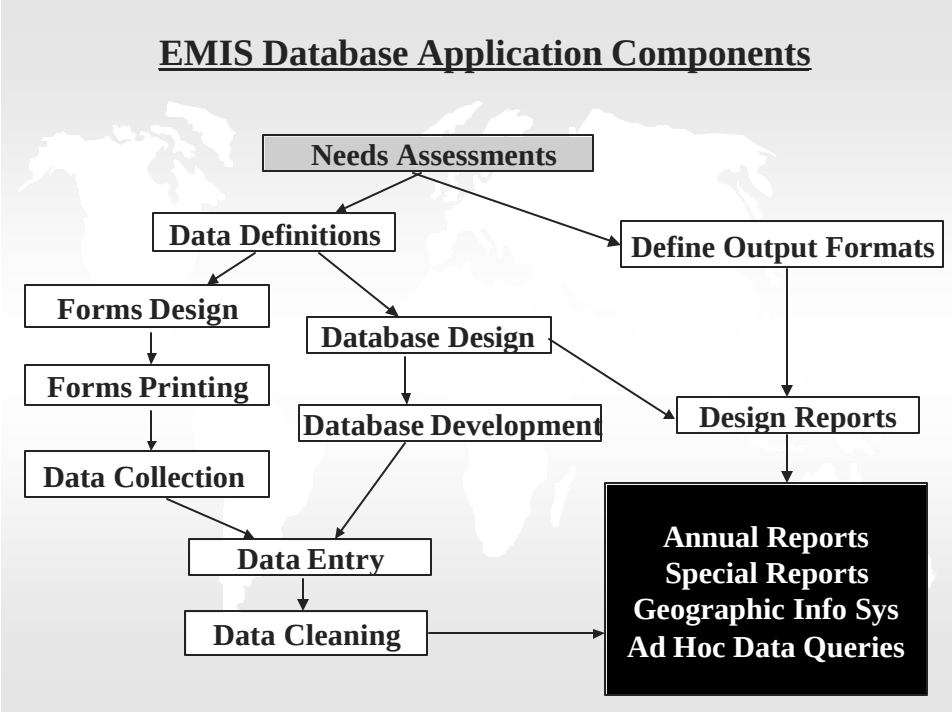
EMIS software application systems are critically important to the entire EMIS effort. The application becomes the tangible manifestation of the EMIS effort and a useful device for focusing peoples' attention on the issues of data definitions and the broader and more complicated tasks associated with changing how departments and units at different levels in the system work with one another. Thus, it is critically important to begin its development early in the process and to involve a broad range of people in its design and development.

To provide the widest possible benefit the EMIS software application system must be school-based and include a wide range of standardized reports servicing the needs of users at each level. "School-based" means that there must be a record in the system for each school. Individual school records would form the basis for local, state and federal ministry use of the EMIS database application. Properly structured, the same base system can serve all levels in the system. For the system to serve the needs of each level, it must be possible to relate and aggregate schools along all relevant organizational dimensions. That is, schools must be identified in terms of all the potentially relevant groupings to which they may belong. For example, the community or village name, the LGEA, the state, etc. With complete categorical classifications of schools, it would be relatively easy to develop automated reports to serve users at each level.

A comprehensive and integrated EMIS would require data and information from a variety of sources from both within and outside the education system. This includes, but is not limited to, data on school-age populations, enrollments, facilities, examination results, teachers and other personnel, etc. This would require the collection of data from within the education system (e.g., via the school census or through exchanges with the departments and units of PRS, School Services, and Personnel) and also the gathering of data and information from other government agencies (e.g., from the population bureau). Once data is brought together, it must be organized in ways that serve a range of users and uses at each level in the system.

The foundation of the EMIS software application should be the school census from which would be derived a large percentage – but not all – of the data required to support policy analysis, planning, management, and administration. Thus, it is important to begin development of the software application with a review of those school census data

elements that can be transformed into indicators of educational effectiveness and recommendations for strengthening and streamlining the school census so that it meets all enduser data needs (e.g., PRS, School Services, and Personnel). Reviews should include a reassessment of current school census data collection forms and processes, procedures for data entry, processing, cross-checking, report generation, and regulations and procedures for accessing database system data. The diagram below illustrates the general process of moving from the needs assessment conducted during the three-week EMIS consultancy in August 2002 to the development of a streamlined school census to an EMIS database application.



The EMIS software application should be built using a prototyping approach. It should be built in a modular fashion with an initial focus on the development of the school census data entry, cleaning and reporting modules that focus on the needs of stakeholders in the primary school communities, LGEAs, SPEBs, and the federal MOE. It is assumed that LGEAs and SPEBS would be provided with notebook computer equipment sufficient to accommodate the EMIS database application and that primary school communities would be serviced with relevant reports from the LGEAs.

VII. Support for Micro-Planning or School Mapping

Micro-planning or school mapping is directly related to the development of an effective EMIS and, in particular, to the school census as it requires detailed knowledge of existing school capacities, the condition of facilities, and current enrollments and utilization

patterns. It also involves the definition of catchment areas and knowledge about the integrity of the catchment system (i.e., in the three states of the country that I visited, it seems that catchment areas are not always respected or enforced). In addition to knowledge about catchment areas, school mapping requires access to accurate current and projected population statistics, the basis for projecting future demand for educational services.

School-mapping is not procedurally very difficult to understand, but can be quite time consuming and labor intensive to complete in the absence of the required basic data. A well organized school census would be helpful. A properly structured EMIS could make the process easier. The difficulties with school mapping invariably result from the absence of good population data, a lack of congruence between school catchment areas and population enumeration areas, and the reality that catchment areas are not respected or enforced. If none of these fundamental problems exist, then GIS may be very effectively applied to school mapping. If they do exist, it may be necessary to address the fundamental problems first. For example, do procedures exist for extrapolating population data from the census to fit educational districts or must they be devised? Is it possible to enforce school registration within well-defined catchment areas? In either case, a phased approach to the introduction of GIS in the school mapping process would begin with the development of GIS in smaller districts facing serious problems, and then expand to other districts based upon lessons learned from the smaller districts.

VIII. Development of a Geographic Information System

The development of a geographic information system (GIS) is closely related to the development of an EMIS database application and can easily be adapted to use the same data and information. The most significant utility of GIS for education is its support for data presentation and its potential impact on focusing and intensifying dialogue on the important issue of educational quality (i.e., literacy and numeracy). GIS can also be useful for supporting school mapping activities, although it can be quite expensive if what is desired are highly detailed, cartographically precise localized maps. Development of GIS in education suggests that while it is possible to develop highly detailed maps for all local areas and schools, it is not always necessary or advisable to do so given the associated costs and resource requirements.

A phased approach to GIS development beginning with the development of state level maps for Kano, Lagos, and Nasarawa and the development of thematic maps that facilitate comparison of critical educational indicators across LGEAs would be a very effective approach. GIS may then be developed for the pilot LGEAs that would facilitate the production and dissemination of school-based, LGEA level maps for dialogue with relevant stakeholders such as members of the PTA. It is advisable to start with a smaller LGEA facing some significant issues and to build accurate, but not necessarily cartographically precise maps. Additional LGEAs could be added over time. Finally, cartographically accurate localized maps could be developed for selected critical needs LGEAs. A phased approach would facilitate a formative assessment of the process that

would include estimates of future levels of effort required and assessments of the potential utility of GIS for educational policy analysis and planning in Nigeria. The level of effort required to build the GIS would be dependent upon the availability of existing computer-based maps and the extent of detail desired in the system.

IX. Strengthening Capacity to Use EMIS Output

Strengthening the capacity of SPEBs and LGEAs to use the output of the EMIS would require technical assistance in policy analysis, planning, monitoring, and management. To maximize its usefulness, training should focus on real current policy, planning, monitoring, and management issues.

Policy issues include concerns about access, the participation of girls, internal efficiency, and student performance among others. Monitoring the development targets and standards will be critical. Focusing significant resources to support the strengthening of capacity of the SPEBs and LGEAs to use data and information effectively to inform relevant stakeholders at all levels of the system is the key to developing a demand-driven data-informed EMIS. Working with selected endusers on real issues to produce a series of policy and planning briefs and planning models using the data and information that is or will be available from the EMIS would contribute significantly to this effort.

Policy and planning briefs are short, 2-4 page papers which seeks to highlight and discuss the potential implications of analyses of EMIS data around selected policy issues. Effective policy briefs should be written in a style which invites wide readership and participation in policy dialogue.

Planning models are built using computers to simulate selected features of the education system to assess the relative effects of alternative policy choices. Properly structured, they will provide a means of testing a range of "what-if" analyses (e.g., how many new teachers will be required and at what cost if we succeed in increasing the enrollment of girls by 20%). Planning models may be as simple and direct or as complex and complete as we chose to make them.

X. Training

The significant focus on capacity building and human resource development suggest the importance of training. A range of possible types of training are anticipated. The exact focus of training is a function of the salient policy and planning issues and the identified gaps in existing knowledge and skills. The need for training in the following areas is recommended:

Area: EMIS Design and Development

- The elements of managing an EMIS
- Systems analysis skills

- Introduction to microcomputers
- The use of database software (e.g., Access)
- The development of database applications
- The production of useful indicators of educational effectiveness
- Tools and techniques for data validation and checking
- Techniques for streamlining data collection instruments
- The use of GIS software
- The design and implementation of Local Area Network
- Administration of a Local Area Network
- The care and maintenance of computers and related equipment

Area: Policy Analysis

- Statistical analysis
- The writing of understandable policy documents
- The production of policy briefs
- Introduction to microcomputers
- The use of word-processing software (e.g., Word)
- The use of spreadsheet software (e.g., Excel)
- The use of database software (e.g., Access)
- The use of statistical analysis software (e.g., SPSS)

Area: Planning

- Enrollment projection techniques
- Models and methods for school mapping and facilities location
- Building education system planning models
- The construction and calculation of indicators of educational effectiveness

AN ILLUSTRATIVE PILOT TEST TRAINING SCHEDULE

	2002		2003			
	Q3	Q4	Q1	Q2	Q3	Q4
DESIGN INITIAL EMIS DATABASE APPLICATION						
Design EMIS computer-based application						
Develop Initial EMIS database application, census module						
Pilot test EMIS database application, census module						
Modification of EMIS database application						
Pilot test modified EMIS database application						
Installation of EMIS database application in selected SPEBs						
Training in systems analysis, as required						
Training in the use of database software						
Training in application development						
SUPPORT FOR MICRO-PLANNING, SCHOOL MAPPING						
Develop methods and procedures for school mapping						
Conduct school mapping in selected LGEAs						

	Training in methods and models for school mapping							
	Training in enrollment projection techniques							
	Training in the use of spreadsheet software							
DEVELOP GIS								
	Training in the use of GIS software							
	Training to digitize base maps							
	Digitize national, state, local base maps							
	Link GIS with available education data							
	Develop initial LGEA-level thematic maps							
SUPPORT DATA UTILIZATION								
	Identify issues in policy analysis, monitoring and planning							
	Work on selected policy, monitoring & planning issues							
	Training in policy analysis methods, statistics							
	Training in the development of indicators of educational effectiveness							
	Training in the development of planning models							

XI. Design and Implement a Comprehensive, Integrated EMIS

Based on the experience of the EMIS pilot test, a plan for the development of a comprehensive, integrated locally-based EMIS nationwide would include the following:

- A set of recommendations for reorganizing organizational structures and/or operational processes and/or working methods to insure timely collection and availability of data and information required to support policy making, planning, and management of the education system at all levels.

- A set of recommendations for decentralizing EMIS operations to the local education authorities that includes the specification of the roles and responsibilities of units operating in the various levels in the system.

- Strategies for eliminating redundant data collections.

- Recommendations of levels of staffing required to build and sustain an EMIS.

- The identification of a comprehensive set of education data and information needed to monitor educational effectiveness in literacy and numeracy and the identification of the primary sources of all required data to maintain these indicators.

- A set of recommendations for integrating data from the various primary data sources.

- Recommendations for the design of a comprehensive EMIS database application.

- Recommendations for the continuing development of a geographic information system.

- The specification of hardware and software requirements based on experiences in the pilot state and local education offices.

- An outline of training needs.

- A detailed implementation schedule, including realistic phasing and expansion of the system to all state and local education offices.

- Detailed terms of reference for required technical assistants and criteria for evaluating their performance.

XII. Concluding Remarks

An education management information system is a data collection, storage, retrieval, processing, production, and dissemination system specifically designed for use by educational decision makers to plan and administer education systems more effectively. The major objective of an EMIS is to support effective monitoring of the attainment of stated educational goals and objectives and to facilitate the efficient direction of resources to achieve them.

There are a clear set of factors associated with the successful design, development, and implementation of EMIS. The importance of taking into consideration the local context for EMIS development (i.e., the need to tailor EMIS to address local information needs and to fit EMIS within the local organizational-institutional-societal-economic context) is critical to successful implementation and long-term sustainability.

The availability of relevant, reliable, unambiguous, and timely data and the provision of these data to endusers and relevant system stakeholders are the foundations of an EMIS. However, long-term sustainability is more dependent on organizational capacity to convert data into useful information and to use this information to expand and improve the quality of the education services it offers. Thus, in addition to resources for improving systems for collecting and maintaining educational data (i.e., the supply side), significant resources must be directed to strengthening the use of data and information for policy making, planning, management, and administration (i.e., the demand side).

Effective EMIS implementation requires the active, cooperative participation of a broad range of educational managers, administrators, and operations-level staff at the federal, state and local education offices, and primary schools. The number and scope of stakeholders is very broad. The potential threats to effective EMIS implementation are many in number. There must be a broad-based "will" to see the EMIS strengthened if efforts are to succeed. To minimize potential threats and maximize the effectiveness of EMIS, the design, development, and implementation process must include consultation with a carefully selected broad cross-section of educators, politicians, community leaders,

and parents representing each level in the system (UBE, SPEB, LGEA, communities, and schools). Stakeholders need to understand what the EMIS is, and is not. They must clearly understand what they are being asked to do. They must see a "benefit" for participation in the process (e.g., improved access to data and information they need, reduction in redundant data requests, more efficient or effective operational activities, better delivery of services, or more responsiveness from higher authorities to the problems they face). In this regard, EMIS development is very largely a social-political-organizational undertaking. It is about mobilizing support and cooperation. Thus, effective EMIS development must begin with a series of individual and group consultations, seminars, and workshops to solicit input and response from critical stakeholders.

Sustained, visible high-level support is critical to the success of efforts to develop and implement effective EMIS. Where support exists, it is important to nurture. When support does not exist, it is important to create it. When decentralization of the EMIS is the intention, it is important to mobilize the support of critical senior educational decision makers in each of the intended EMIS locations it. Thus, significant attention must be given to insuring that senior educational decision makers understand what EMIS is, and is not, and that the EMIS explicitly focuses on selected critical needs of senior educators at each level in the system.

In many places, EMIS design and development has been approached largely as a technical exercise, as an effort to put enough of the "right" technology in the "right" places. This emphasis on technology has, in many cases, resulted in the disenfranchisement of educators and relevant stakeholders from the process of EMIS development with responsibilities for EMIS being given to technicians who have little or no knowledge of the details of how education systems work. Technology offers tremendous potential benefits, but it is not the most important element in developing and maintaining an effective and useful EMIS. Existing information systems are not working due to an absence of technology, but rather to the limits of existing organizational structures, to the lack of effective horizontal and vertical communication systems, and to work patterns across divisions, units, and levels that are often not well integrated or synchronized. The success of EMIS depends more on improving existing operations, strengthening existing channels of communication, opening and maintaining new communications paths, and integrating and synchronizing work tasks across units than it does on the introduction of new technologies. The real challenge is to build organizational and institutional structures and processes that support the development of a culture of demand-driven data-informed decision making. Thus, the design and development of effective EMIS must begin with an emphasis on organizational and institutional development and requires more direct involvement of professional educators who know how an education system works and who have a vision for how it might work better.

Institutionalizing effective EMIS in Nigeria may take many years. Changing structures and processes and institutionalizing new systems in complex organizations takes time. Education systems are quite complex and operate in cycles that are one year and longer,

(e.g., the school year and budget process operate on an annual cycle; textbook production can take anywhere from 18 months to two years or longer; and planning cycles can be one, three, or even five years). This means that at best, each iteration of the EMIS requires one year to complete. To build an effective EMIS across a large number of state and local education offices and schools can require anywhere from four to ten years. The effectiveness and efficiency of EMIS development efforts could be enhanced by strategies that seek to extend and sustain EMIS activities beyond the traditional two to three-year timeframes used by most development projects.

Appendix 1. Summary of Data Collection Elements by SPEB

	State Primary Education Board Department of Planning, Reseach, and Statistics		
	Kano	**Lagos**	**Nasarawa**
Data Elements Collected from Primary Schools and LGEAs	School Bio Data: • Name of School • School Address • Location (Town or Village) • Rural or Urban Location • Local Government in which located • Year Founded • Type of School (Secular, Islamiyya, Nomadic) • Proprietor (Public, Community, Religious, Private, Voluntary) Enrolment Figures: • Class • Stream • Gender (Male, Female, Total) • Number Repeating the Class if any Physical Facilities – Pupil and Staff Furniture, Chalk / Blade Boards, and Cabinet Cupboards by: • Classrooms (Streams) • Library • Offices • Staff Common Room • Store • Assembly Hall Access to: • School Road • Water • Electricity • Water • Recreation Facilities	School Identification: • Name of School • Physical Location / Address of School • Year Founded • Number of Classrooms • Number of Streams • Pupil Population by Sex • Teacher Population by Sex School by Type: • Normal/Special • Domestic Science Ctr • Handcraft Ctr Pupil Enrolment by Class and Sex Facilities in Schools: • Pupil Population • Pupil Furniture *Available* (desks and benches) • Pupil Furniture *Needed* (desks and benches) • Teacher Population • Teacher Furniture *Available* (chairs and tables) • Teacher Furniture *Needed* (chairs and tables) Classrooms and Streams: • Number of Classrooms Available • Number of Classrooms Required • Streams (Pry 1-6, Total)	School Identification: • School Name • Year Founded • No. of Classes • Grade of School • District Located • No. of Tchrs Present • No. of Catholic Pupils • No. of Muslim Pupils • No. of Protestant Pupils • No. of Pupils • Date of Submission • Over staff with… • Under staff with… • No. of R/I • No. of N/W • Grand Total Staff • Submitted on: Staff: • Name • Sex • Date of Birth • Qual. Pass. • Year Grad. • 1st Appt. • Date of Pre. Appt. • Area of Discipline • Rank • LGC of Origin • State of Origin • Class Taught • Enrollment: Boys, Girls, Total • Salary Zonal Profile for Month of: Name of the Zone Name of the School Date of Last Inspection Last Supervisor

	Total Number of Teachers Teachers by Qualifications: • Graduate with Teaching Qualification • Graduate without Teaching Qualification • NCE • Diploma • Grade I • Grade II (Certificate) • Grade II (Referred) • SIS/HIS (Certificate) • SIS/HIS (Referred) • HSC/GCE/AL/FTC • WASC/GCE/OL/SSC • Others • Total General Information: • School Fence • Dilapidated Classrooms • Abandoned Project? • If Yes, Type of Project and Total • Availability of Land for Expansion • Number of Toilets (Male and Female) • General Comment on Physical Situation of School Now Number of Classrooms Renovated by the Board If Any by Year: • 1997 • 1998 • 1999 • 2000 • 2001 Number of Pupil Furniture (Classroom Furniture) Given by the Board by Year: • 1997 • 1998 • 1999 • 2000 • 2001 Number of Classrooms Renovated by: • PTF (Petroleum Trust Fund) if any • Those yet to be renovated Number of Dilapidated Classrooms that need	Total) Number of Teachers by Sex and Grade Level Number of Teachers by Sex and Qualification: • Graduate w/o NCE • Graduate • NCE • Grade II • Grade III • ADE, AGE, FTC, HSC • WASC, GCE, SSCE • Others • Total Teaching and Non-Teaching Staff Positions: • Teaching Staff in Primary School • Non-Teaching Staff in Primary School • Teaching Staff in LGEA • Non-Teaching Staff in LGEA • Total Guards and Cleaners Statistics by Sex: • Night Guards • Day Guards • Office Attendants • Cleaners • Total Teachers Lost in Primary School by Sex & Reason in LGEAs: • Left Without Reason • Transfer • Dismissal • Resignation • Death • Study Leave • Others Retirement • Total Number of Auxiliary Teachers by Sex & Grade Level in Primary School: • 03 • 04 • 05 • 06 • Total LGEA Staff Positions by Sex:	1. School Records (place for a comment – two lines for each of the following) 2. Sanitation of the School 3. Classroom Accommodations 4. Learning Equipment 5. Staff Enrollment Staff Strength: • B.Ed. • GR IIR • NCE • Others • ACE • GR IIP • Furniture Available • Furniture Needed

	immediate renovation and rehabilitation Number of Classrooms renovated by the LGEA (Minor Repairs) School Records Availability or Comment if Necessary: • School Time Table • Classroom Time Table • Daily Attendance Register • Visitors Book • Log Book • Class Attendance Register • Admission Register Number of Actual Pupils' Attendance by Sex: • PR I • PR II • PR III • PR IV • PR V • PR VI • Total	• Salary Grade Level • Secretary's Office • Personnel Dept • PR&S Dept • Account Dept • School Services Dept • Day/Night Guards • Others • Total	